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GROUND WATER RESOURCES AND THEIR CONSERVATION

THE GROUND WATER PROVINCES OF THE UNITED STATES

A—The Coastal Plain

While ground water supplies are available in practically all parts of the United States, they are found in so many different water-bearing formations and under such a variety of geologic conditions that their manner of origin and occurrence is not always the same.

Ries and Watson in the book "Engineering Geology" divided the country into ten ground water provinces. Later Dr. O. E. Meinzer of the U. S. Geological Survey designated twenty-one ground water provinces, the approximate boundaries of which are shown on the map. These divisions are somewhat arbitrary says Dr. Meinzer (W.S.P. 489) both as to the number of provinces and their boundaries, but they serve to give us an idea of ground water conditions in various parts of the country.

In making the divisions, Dr. Meinzer gave consideration to the important aquifers in the country, such as, the glacial drift, valley fill in the Western basins, lava formations, the Tertiary formations of the Great Plains, the Cretaceous formations of the interior, including the Dakota sandstone, also the Paleozoic sedimentary formations and the crystalline rocks of the older formations. Dr. Meinzer's designation of provinces was as follows:

A. The Atlantic Coastal Plain Province.

A glance at the map shows that this province A extends along the Atlantic Coast from New Jersey on the north, to Florida on the south, then around the Gulf of Mexico to Texas. It extends inward from the shore line, through the central part of New Jersey, all of Delaware, a part of Maryland, Virginia, North and South Carolina, through the central part of Georgia and Alabama, then northward through the western part of Tennessee and Kentucky, to about Cairo, Illinois, then southward through the central part of Arkansas and Texas, terminating in the Rio Grande River west of the Big Bend country.

The situation as far as material is concerned, has not improved during the last 60 days and the indications are that it will not do so in the near future.

We therefore urge our customers again, to have this in mind and give us as much advance notice as possible. Otherwise we may not be able to take care of you with our usual promptness.

This is one of the most important and best known water provinces in the country.

Water is derived chiefly from Cretaceous. Tertiary and Quaternary strata consisting of sand and gravel interbedded with clayey beds. Large quantities are obtained from alluvial deposits in the Mississippi Valley and adjacent areas, with the water ranging from high to low in mineral content.

In New Jersey the Atlantic Coastal Plain extends from the ocean to a nearly straight line through Trenton and New Brunswick. The land surface has a gentle slope to the southeast, most of it not exceeding 5 or 6 feet to the mile. (Bulletin No. 50, Department of Conservation and Development). Eastward it extends under the ocean surface at the same gentle slope for about 100 miles, where at a depth of 100 fathoms (600 feet) it drops off to great depths. This submerged part of the Coastal Plain is known as the continental shelf. Further south the Coastal Plain extends to as much as 150 miles from the shore and the continental shelf approaches the shore until in Florida it almost disappears. Northward it extends to New York City and the peninsula of Cape Cod.

Outstanding features of the Coastal Plain in New Jersey are marshes along the streams and estuaries from the sea. In New Jersey the formations of the Coastal Plain appear to be lying in a horizontal position. Actually they slope gently toward the Atlantic

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Map of Ground Water Provinces (after Meinzer)

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Coast. The beds appearing at the surface in the northwest portion rest upon undulating beds of very old hard rocks. Drill holes frequently strike the bedrock in the northwest part but farther southeast towards the ocean the deposits become thicker, 490-500 feet at Highstown, 1,115 feet at Prospertown, 1,336 feet at Jackson's Mills, and more than 2,300 feet at Atlantic City.

Throughout northern New Jersey the valleys of the larger streams are floored with alluvium and deposits of sand and gravel which form terraces along the slopes bordering some of the valleys. Much of the surface, especially north of a hilly glacial moraine extending from Perth Amboy, through Morriston, Dover, Hackettstown and Belvidere, is covered by glacial drift. In the Coastal Plain area remnants of early deposits of sand and gravel are widespread in central and southern New Jersey. The more recent beaches, dunes, swamps, and marshes are mostly thin veneers of sand, gravel, and mud which overly the great mass of strata of Cretaceous and Tertiary origin which make up the body of the formations in the Coastal Plain.

Inasmuch as the Coastal Plain in New Jersey constitutes about sixty per cent of the state's area, it is important from the standpoint of ground water. Due to the unconsolidated nature of the formations in this area, they have a great storage capacity for water. In places there are heavy beds of clay and marl which act as confining beds on the ground water beneath them. Over 1,500 wells in the Coastal Plain obtain their supply from these artesian beds, probably the best known being the Raritan formation of Cretaceous origin. The formation is not continuous but whenever found constitutes a reliable source of water supply. The Englishtown, Mount Laurel and Wenonah sands are important aquifers as is the Red Bank sand in the northeast. The Kirkwood formation of Tertiary origin which covers more than half of the Coastal Plain is also an important source of water, while the Cohansey and Vincetown sands found below the beaches are important throughout the whole length of the Coastal Plain in New Jersey.

In Virginia the Coastal Plain extends westward to the Piedmont Plateau, the two provinces being separated by an exposure of crystalline rocks which make rapids in the rivers. This zone of rapids has been named the "fall line." The surface of the Coastal Plain in Virginia slopes toward the sea at about three feet to the mile, the unconsolidated deposits lying on a floor of crystalline rocks that dip toward the sea. The thickness of the beds in the Virginia Coastal Plain is not known in all localities but at Fort Monroe a deep well passed through 2,242 feet. (Bulletin No. 5, Virginia Geological Survey).

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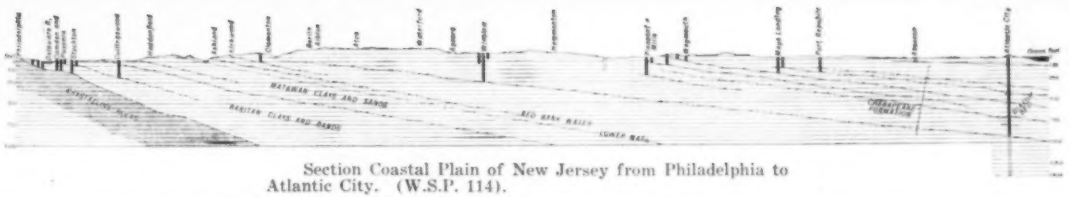

Section Coastal Plain of New Jersey from Philadelphia to Atlantic City. (W.S.P. 114).

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Throughout the Tidewater area of Virginia there is a great succession of gravel, cobble beds, sands and clays known as the Potomac group of Cretaceous origin. The most striking characteristic of many Potomac outcrops is the dissimilar mixture of materials. The sands are prevailingly cross-bedded; in places the minor beds are steeply inclined but no bed is continuous for any great distance. The Potomac beds were classified many years ago by W. B. Rogers. Since then they have been studied in more detail and variously subdivided, the principal divisions being the Patuxent which is older and the Patapsco which is younger. The Patuxent is found along the river valleys near the "fall line" from Alexandria to Petersburg. It is composed of cross-bedded sands and clays in discontinuous beds. The clays are usually gray, dark green or chocolate in color and dip to the east from 30 to 60 feet per mile.

The Patapsco formation has been found north of Fredericksburg and near Mount Vernon. South of Fredericksburg it is absent or is overlapped by other deposits. The Patapsco is clayey rather than sandy. The clays are bright colored, thicker and more stratified than those in the Patuxent. The formation dips to the east at 30 feet to the mile. The sandy beds of the Patuxent underlie most of the Coastal Plain in Virginia and are large reservoirs of ground water. However, the Patuxent offers problems to well drillers on account of the varying character of the formation. Usually it is safe to assume that one of the sandy beds will carry a satisfactory supply of water.

In the upper Cretaceous formations found in the Tidewater area of Virginia the Pamunkey group is an important source of water, though the sands which give flowing wells are relatively thin and few in comparison to the total thickness of sandy material seen in the outcrops of the formation. The glauconite sands having more open space between the particles give up water more easily than the "quartz" sands. The Chesapeake and Columbia sands of the Coastal Plain lying nearest the surface yield fair to good supplies of water though it varies in quality from one place to another.

In view of the fact that all of the formations in the Coastal Plain of Virginia slope to the east and some of them contain clay beds, the formations are more or less artesian throughout the area. However, due to the unevenness of assortment, difference in size, shape and arrangement of the sand particles, water circulates through the formation at various rates. On this account and the uncertainty of the head due to outcrops, it is difficult to establish the loss in head through the formations. Consequently the artesian levels vary from place to place.

In North Carolina enormous quantities of ground water are available in the Coastal Plain, according to M. J. Mundorff of the U. S. Geological Survey, but only a small percentage of the amount available is being used. The problems at the present time (1944) are chiefly those of quality and quantity. The principal water-bearing formations in the Coastal Plain of North Carolina are strata of sand and gravel beds of semi-consolidated shell rock which are found in the various formations. As these water-bearing strata are seldom uniform over any considerable area, the primary problem is that of obtaining sufficient data as to the depth, thickness, and nature of these formations.

Much information regarding the formations themselves is lacking, but geologists have recognized the Patuxent formation of Cretaceous age and the Tuscaloosa in the northern half of the Coastal Plain. In the southern half the basal formations are probably Tuscaloosa. Overlying these older formations are the younger ones of Eocene age such as the Castle Hayne marl and the Yorktown of Miocene age which underlies the Coastal Plain north of the Neuse River. Above these formations are the Pleistocene terraces forming a blanket 20 to 30 feet thick over all

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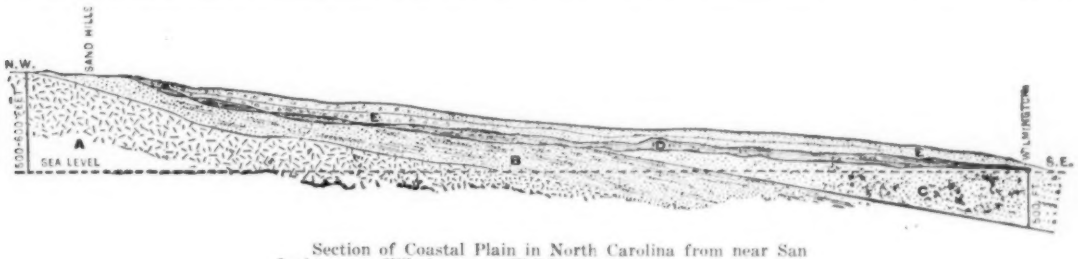
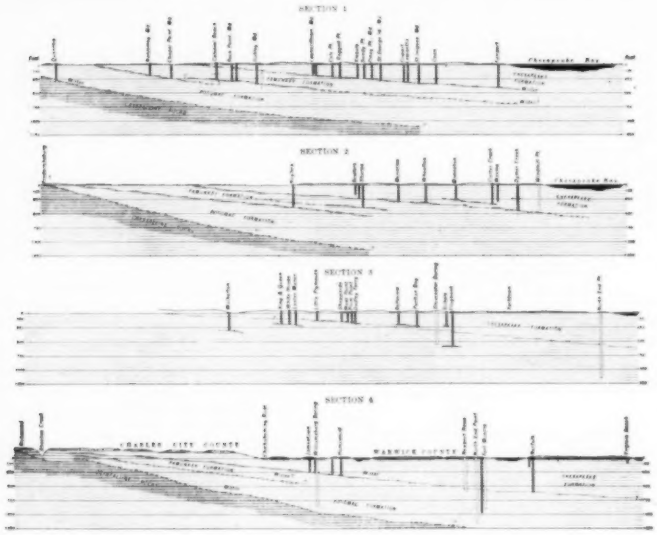


Section of Coastal Plain in North Carolina from near Sanford to near Wilmington. (W.S.P. 114).



Sections of Coastal Plain in Eastern Virginia. (W.S.P. 114).

Ground Water Resources and Their Conservation

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the formations mentioned above and extending westward onto the crystalline rocks in the "fall zone." The average slope of the basal rock is about 13 feet to the mile in the southern part of the area and 20 feet to the mile in the central part. The dip of the Cretaceous formations lying above the basal rock is steeper than that of the younger formations at the surface. Dr. Meinzer has estimated the annual recharge to the area might be 1,000,000 gallons per day per square mile, but on account of losses the safe yield would be nearer 500,000 gallons per day per square mile.

The Coastal Plain in Georgia occupies more than half of Georgia, its inland boundary being a crooked line passing through Columbus, Macon and Augusta. All of the deposits in this area are sedimentary of Upper Cretaceous age. The deposits of Lower Cretaceous origin seem to be lacking in Georgia, though they are found in the Coastal Plain from Virginia northward and in Arkansas and Texas.

In this region the formations are Cretaceous and Tertiary clays, sands, and soft limestones, dipping toward the south a few feet per mile. The sands and limestones usually furnish satisfactory supplies of water and in a few places has had sufficient head to furnish water for irrigation and industrial use. The waters from the Cretaceous beds are usually soft, while those from the Tertiary are hard and unsatisfactory for many purposes.

In addition to the underlying older formations, there are two surface formations, the Lafayette and the Columbia, which are of importance for water supplies for shallow wells. These formations contain clays and sands and practically cover the Coastal Plain in Georgia. The Lafayette is the older lying above the Cretaceous. It is composed of orange colored sands and clays with local beds of gravel. Overlying the Lafayette is the Columbia formation which is mostly fine sand varying in thickness in different parts. The two surface formations are the principal sources of water suppy throughout the Coastal Plain. These formations are largely responsible for the amount of rainfall absorbed and consequently passed on to the Cretaceous formations lying below.

Geologically, Florida is one of the most interesting states in the country as the history of its formation is varied and complex. Hydrologically, it is all in the Coastal Plain but its hydrology varies from place to place rapidly. It is rather difficult to visualize its ground water situation without considerable study. Apparently in Miocene time there was a land surface of clay, marl, limestone, sand and shells upon which subsequent Pleistocene sediments were laid down to form a level surface sloping to the south from the middle of Florida. On this surface the early seas left many deposits of limy materials, sandy and shelly materials with large quantities of clay and marl. In places there were accumulations of gravel. Later on in geologic time the sea le.els lowered and the present surface emerged. During the glacial period, the land surface was repeatedly flooded with accumulations of fresh water marls, sands, and organic deposits. These deposits have since been changed by the action of wind, rain, surface, and ground waters into their present state.

In southern Florida the most important water-bearing formation is the Tamiami and the most wells have been developed in it. The Pamlico formation, Anastasia formation, and the Miami oolite are utilized in the development of small supplies. The Caloosahatchee and Buckingham marls and the Fort Thompson formation are relatively poor sources of water. There is much more that could be said about the Coastal Plain formations; however, a knowledge of local geology is essential to a clear understanding of ground water conditions in Florida.

In Alabama the Coastal Plain boundary enters the state on the east just below the center and then veers off to the northwest towards Montgomery and passes out of the state in the northwest corner. The formations are very similar to those found in the Coastal Plain of Georgia, according to Special Report 18 of the Geological Survey of Alabama and Water Supply Paper 114; and the region includes about three-fifths of the state's area.

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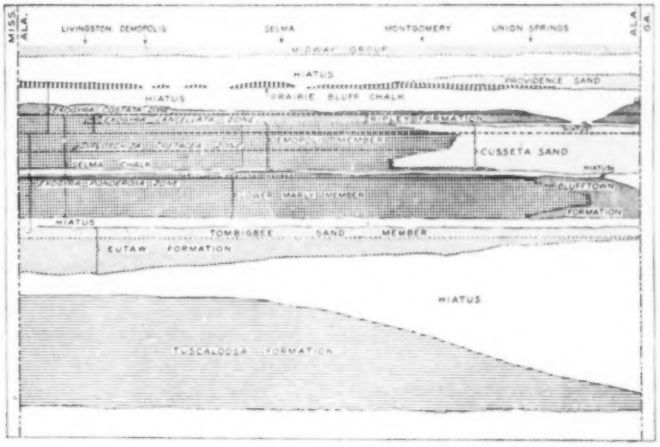
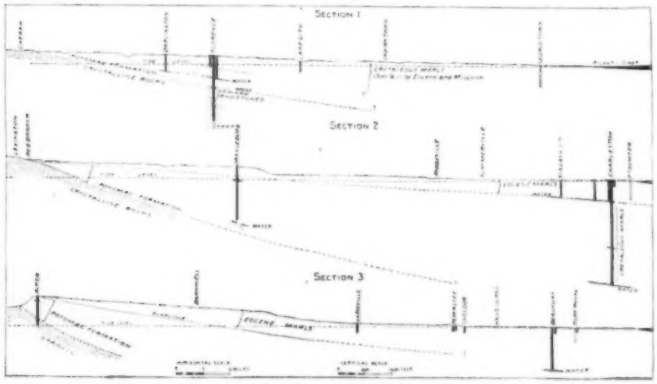
Here again the important water-bearing formations are found in the Cretaceous and Tertiary, the strata of both being alternating beds of sands, clays, and marls which dip toward the Gulf of Mexico at a rate of about 40 feet per mile. Above these formations are those of the Lafayette and the Grand Gulf, the Lafayette being far more extensive as it covers most of the area. The ground waters in the Coastal Plan are therefore obtained from these two sources, the lower waters from the Cretaceous and Tertiary are artesian, while those from the two surface formations are non-artesian. In texture and color the Grand Gulf group resembles the Lafayette formations but they always underlie the Lafayette and are more limited in area and more regular in stratification. The formation makes a good cover for the artesian waters below because it contains thick stratas of clay in its upper members.

Passing to Mississippi we find that practically all of the state lies in the Coastal Plain. The oldest rocks are found in two counties in the northeast corner and known as the Mississippian limestones. Southwest of these rocks are the Cretaceous formations occupying the remainder of the state. We find the same order as in the other states up to and including the Grand Gulf with the exception of some deep lying coal beds. The Grand Gulf is by far the most extensive formation in the state and consists of a variable series of sands, sandstones, and lignite clays. It is a very good source of water and many supplies have been developed in it. At Hattiesburg, Laurel, Brookhaven, and Natchez wells are about 400 to 500 feet deep under artesian pressure.



Diagrammatic section showing stratigraphic relations of Cretaceous formations in Alabama.

The upper or surface formations such as the Lafayette are not too widespread or well defined, but where present supplies of pure soft water can be obtained from shallow wells. In places there are surface deposits of loess and a greenish clay called Ponchartrain clay. The Biloxi sands are found in the gulf coast and alluvium in the Mississippi delta and the lower stream deposits of other streams. As a whole, the formations of the Coastal Plain furnish practically all of the ground water developed in Mississippi.



SECTIONS IN EASTERN SOUTH CAROLINA

In Tennessee the Gulf Coastal Plain extends from the Tennessee River Valley westward to the bluffs overlooking the Mississippi River flood plain. Along the Kentucky border its width is about 65 miles. The topography of the sandy formations is rolling to hilly, while the clays and loams are often flat. The oldest sands are the Coffee sands of Cretaceous age which outcrop along the eastern edge of the Coastal Plain. Westward they dip under the Rotten limestone which consists of green sand and fine grained joint clay. The water obtained from springs is often hard and of disagreeable taste and odor.

Good water can be obtained by going into the Coffee sand below. Lying west of these formations are the Ripley sands running from 400 to 600 feet thick. These sands are water-bearing and are the source of supply of many shallow wells. Above the Ripley beds is the Porters Creek clay. On top of the Porters Creek formation is the Lignite group extending westward to the bluffs along the Mississippi River. These formations are 750 feet thick at Memphis and its sands are water-bearing throughout. This is the most important aquifer in western Tennessee.

The Lafayette is thinly spread over the formations and above this formation there is a loess belt 12 to 25 miles wide. In the flood plain of the Mississippi River the deposits are recent silts which con-

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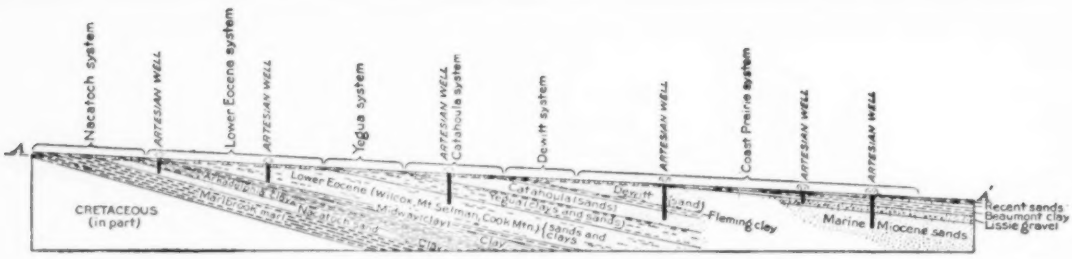

—Diagram showing the artesian systems of the Texas Coastal Plain.

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tain water of poor quality from shallow wells.

Swinging westward from Cairo, Illinois, the Coastal Plain takes in a small part of the southeastern corner of Missouri, then turning southwesterly through Arkansas and Texas. In Louisiana and Arkansas south of the Arkansas River the formations are the same general structure as the Coastal Plain of which they are a part. In Louisiana and southern Arkansas the older beds slope toward the Mississippi River as well as the coast. Some of these older beds have been very much disturbed and broken by folding and often contain salt water. The principal water beds are the Bingen sand, Nacotah sand, Sabine sands, Catahoula sandstone, and the younger sands and gravels. These sands and gravels are found under a large portion of southern Louisiana and are the most important water beds in the state, and when covered with clay deposits produce artesian flows. Under the main river valleys of northern Louisiana and southern Arkansas there are thick deposits of sand and gravel from which water supplies are obtained from shallow wells.

Passing out of Arkansas in the southwestern part of the state the Coastal Plain enters Texas and extends along the coast to Yucatan in Mexico. In the state of Texas the Coastal Plain is divided into: (1), the coast prairie; (2), the Kisatchie hills; (3), the red lands; (4), the Yegua timber belt; (5), the Corsicana cuesta; (6), the Black Prairie; (7), the Grand Prairie; (8), the central basin region; (9), the high plains and plateaus; and (10), the Cordilleran region.

The formations of the Coastal Plain in Texas have been elevated since their formation and all are slightly tilted toward the Gulf of Mexico. Rocks of Carboniferous age are the basic rocks upon the rocks of Cretaceous age and younger have been deposited. To describe all of the formations in the Coastal Plain of Texas, several volumes would be required. In the eastern Coastal Plain the Midway formation is the lowest of the Tertiary formations. It lies above the Cretaceous and below the Wilcox. It is mostly clay containing little or no water which makes it important as a guide to well drillers. The Wilcox lying next above occurs in Arkansas, Louisiana, Mississippi, Alabama and Georgia, being known by various names. The formation contains beds of sand, sandstones, clays, and lignites. It is an important water producer.

Lying above the Wilcox are the formations of the Claiborne group. Most of the formations in this group are water-bearing. Still higher are the formations of Oligocene and Miocene time. All of these are known by geological names and in places are water-bearing. The Pliocene formations containing the well known Uvalde are not important water producers. Passing to the formations of Pleistocene time we note the Lissie gravel which lies under the Beaumont clay. The Lissie gravel is thick in most places and constitutes one of the most important ground water reservoirs in the Coastal Plain.

When these formations were laid down there was deposited in the valleys of the major streams a series of terraces, known geologically as the Highest, the Middle, and the Lowest Terrace. These terraces are an important source of water. Along the coast and bottom lands the alluvial deposits of Recent age are found. On the Coastal Plain of Texas the nature of the formations is such that five artesian areas are present, known as the Coast Prairie, Dewitt, Catahoula, Yegua, lower Eocene, and Nacotah. Each area contains a number of water-bearing beds, but any particular bed may be local in its extent; therefore conditions are different for different localities in these formations. Any one interested in the water-bearing formations of the Coastal Plain in Texas will do well to carefully study the geology of the region involved before starting drilling operations.

—o—

DRILLER'S TRICK

While travelling through the country we picked up an old time driller's trick which may be of interest and come in handy if you want to measure to the bottom of casing.

This driller said when he got into an old well and wanted to see how much pipe there was in the well, he would take a small cow bell or anything of that kind, and take the clapper out of it, tie a string to the top and lower it down into the well, at the same time hitting the side of the pipe with it. The bell will ring just as long as there is pipe in the well but when you go below the pipe it will not ring. This, of course, will not apply if the pipe goes below the water level, but it is a good way to locate the bottom of your pipe if it is above a water-bearing formation.

—o—

Wife (trying on hats)—"Do you like this one turned down?"

Hubby—"How much does it cost?"

Wife—"Twenty dollars."

Hubby—"Turn it down."

A NATIONAL WATER POLICY

Prior to 1920 water policy questions in this country were primarily related to the rights of individuals and the laws of states. The Federal government, under the Commerce Clause of the Constitution, had already assumed responsibility for the maintenance of channels for navigation, and developed a reclamation program in the West for public lands, with the exception that costs would ultimately be repaid by the users. The government out of consideration for navigation interests had also accepted authority for licensing hydroelectric developments on so-called navigable streams and on public lands. It had also assumed responsibility for protection from flood damage to interstate commerce.

After 1920 there was an insistent demand for the government to assume full responsibility, including financial responsibility for the abatement of flood damage. This culminated in a national policy to that end in 1936. During the last twenty years there has been a steady expansion of Federal responsibility for the reclamation of arid lands, and an extension of the reclamation program into projects beyond the ability of the users to repay. Naturally, this has resulted in a steadily increasing charge to Federal taxpayers. At the present time estimates for the Federal program on one river alone amount to two billion dollars and annual appropriations of $500,000,000 are being made to carry out such programs under the headings "Flood Control," "Rivers and Harbors," "Reclamation," etc. In 1948 the government also assumed responsibility for the control of stream pollution.

These Federal programs with others have encroached on the previously recognized rights and responsibilities of individual states and have limited the possibilities of water development by private initiative. This greatly expanded Federal program is being planned and executed through a variety of government agencies, and is being presented to, considered by, and authorized by Congress. There has been a growing conviction on the part of the public that our water programs as conducted by the government are not satisfactorily co-ordinated between the various departments interested and as a result are being carried out without any recognizable overall, comprehensive policy.

When, to this confused situation as far as the government is concerned, we add the complications and conflict of interests between the Federal government and the states, and when the interests of the individual, whether beneficiary or taxpayer are considered, it appears to be obvious that there is urgent need for a complete review of the national water situation in all of its aspects, and the early development of a policy to guide and control the development and the use of this great national resource.

In August, 1947, the Engineers Joint Council, which is an organization of the five national engineering societies, at the instance of the American Society of Civil Engineers, "took steps to institute the creation of a National Water Policy Commission charged with the investigation and reporting, among other things, upon the several elements affecting the orderly and economical development of the water resources of the country, with recommendation as to legislation and administrative organization necessary to affect the ends sought."

As an initial step, the Engineers Council set up a committee to formulate plans for such an investigation and report. This committee reviewed the whole field of water resource development, considered present procedures, and called attention to the confusion and lack of coordination in our present water resource programs. It filed its report on January 21, 1949, outlining the study needed, and recommended that the engineering profession be organized to undertake the work and present recommendations to Congress. The Council approved the objectives of the report but felt that work itself should be undertaken by the National government by the creation of a National Water Policy Commission.

On January 3, 1950, the President of the United States having been advised of the work and interest that the engineers had shown in the development of an adequate national water policy created by executive order a temporary Water Resources Policy Commission of seven members. This Commission invited the Engineers Joint Council to present "a full presentation of such aspects of the matter as you would want the Commission to consider." Under this authority the Engineers Joint Council invited some seventy-five of the leading engineers in the country to serve on a Task Committee for the purpose of developing a statement of desirable water policy. After a tremendous amount of work done under a time limitation entirely too short the finished report of the Engineers Joint Committee was presented to the President, July 1, 1950. The report was rather startling in its completeness and also in its frankness. There has been much editorial comment on it, as the Committee stated that "the present rate of planning and Congressionally authorizing water resources developments is excessive and economically unsound."

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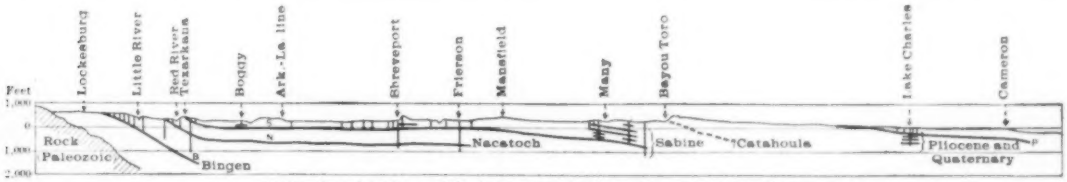

—Section from Locksburg, Ark., to Cameron, La., showing principal water-bearing beds.

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W. M. Bollenbach—Business Manager
E. W. Bennison.....Editor

Advisory Staff

K. M. Brown, Past President of A. A. W. W. D.

Jack J. Hinman, Jr., Col.—Corps of Engineers, U.S.A., (Rtd.)

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EDITOR'S NOTE

Tom very kindly relinquished this space in order that the following letter might be presented.

AN OPEN LETTER TO ALL WELL DRILLERS

Some little time ago I was reading the June 3rd issue of the Prairie Farmer, a farm magazine that has a national circulation, and is one of the leaders in its field. An article headed "Drilling Wells" caught my eye. Since reading this article my mind has constantly come back to the theme it covered —so much so that I believe that every well driller should not only read it but should also sit down and think it over.

Here is the article:

DRILLING WELLS

Well drillers of all kinds are very busy these days. Not only are thousands of new wells being put down in suburban and farm communities, but many people are having to deepen on old wells because of dropping water levels.

While the large majortiy of well drillers are both honest and competent, there are disturbing reports that some are skimping their work or overcharging. Unless you know your driller very well and he has a good local reputation, it might be well to watch his operations carefully to see that you are getting your money's worth. Most drillers charge by the foot, and some have been known to add imaginary feet to the depth of the well to increase their earnings. The way to check on this is to keep in close touch with the drilling operations and know exactly at what depth the driller is working each day.

The disturbing thing is not only what it said of well drillers but the implications as well. We know that in all lines of endeavor there are always some people who are scoundrels and whose actions bring condemnation of the entire group. However, when criticism does arise, it is well to analyze the situation and determine if such criticism is justified or if it is unjust.

If the criticism is unjust, the matter can usually be rectified by a retraction of any such statements. If, on the other hand, the criticism is justified or has any grain of truth to it, then the industry involved should take heed and corrective measures should be taken before more harm is done. One is led to the conclusion that an article of this type probably would not have been written unless there had been numerous complaints over a wide area. That makes it an even graver accusation.

Over these past forty-six years, Edward E. Johnson, Inc., has had for its customers the well drillers of this country. They have been good people to do business with—they have been industrious—they have been, on the whole, progressive. Much headway has been made in recent years in giving the well owner a better job in all ways.

These drillers are not only our customers but our friends. Their problems are our problems. We are proud of them and we'll fight for them. We don't like to have any one cast reflections on them. If, however, there should be any justification to such charges, then we feel all of us should get busy and make the necessary corrections. The various state and local drillers' associations should set up

(Continued on Page 9)

Nebraska
H. O. Parkert, President.....Hooper
Vincent H. Dreessen, Secretary U. of N., Lincoln

Nevada
S. R. McKinney, President.....Las Vegas
William Wright, Vice-President.....Dyer

New Jersey
Fred Bock, President.....Rochelle Park
Chas. Greenhalgh, Secretary.....Lakewood

North Carolina
W. A. Kirkley, President.....Charlotte
R. O. Heater, Sec'y-Treas.....Raleigh

North Dakota
Alfred Jaeger, President.....Mooreton
Fred V. Sletvold, Sec'y-Treas.....Oakes

Northwest
M. West, President.....Salem, Oregon
Frank Gaut, Secretary.....Beaverton, Oregon

Ohio
L. E. Bushong, President.....West Mansfield
E. D. Allen, Sec'y-Treas.....Steubenville

Oklahoma
Al Braithwaite, President.....Enid
L. J. Clarke.....Oklahoma City

Oregon
T. J. Burkhart, President.....Portland
Ken Brook, Secretary-Treasurer.....Scappoose

Pennsylvania
EASTERN DIVISION
Norman A. Cook, President.....Langhorne
Thomas Magee, Secretary.....Philadelphia 25
WESTERN DIVISION
G. W. Walters, President.....Rimersburg
Mrs. Merle Butcher, Secretary.....Washington

Rhode Island
D. O. Hamilton, President.....Portsmouth
D. E. Whelan, Secretary.....Providence

San Joaquin Valley (California)
Jack De LaGrange, President.....Madera
Glen V. Slater, Secretary-Treasurer.....Fresno

Texas
O. F. Jensen, President.....Houston
Geo. Ringstaff, Secy.-Treas.....Houston

Virginia
B. A. Chappel, President.....Roanoke
Jack Sundquist, Secretary.....Norfolk

Washington State
Oliver F. Zinkgraf, President.....Spokane
O. E. Erdman, Sec'y-Treas.....Elma

Wisconsin
George Galloway, President.....Milwaukee
Ralph H. Nienow, Executive Secretary.....Merrill

(Continued from Page 8)

standards and see that their members follow them. The public should be told what these standards are.

If there are no associations in certain areas, they should be formed to protect the drillers in those areas against unjust criticism or to correct practices that are "sharp."

The only place any correction can be made is right at home—in each local area. If that is done, then the whole picture will be as it should be.

The purpose of this letter is none other than to call attention to a criticism of our customers and friends in order that such criticism, whether right or wrong, may be corrected. Should there be any merit to these accusations and should they be permitted to continue, then the final result will be regulation and legislation of a sort that probably will be distasteful to the industry.

It doesn't seem fair that a few unscrupulous members of an industry should be permitted to make it rough for the vast majority.

We hope drillers all over the country will give this problem some serious thought.

Sincerely,
W. M. Bollenbach, Pres.,
Edward E. Johnson, Inc.

——o——

NEW DISTRIBUTOR

The Bucyrus-Erie Company of South Milwaukee, Wisconsin, announces the appointment of The Straker Supply, P. O. Box 112, Mt. Pleasant, Michigan, as distributors for their drilling equipment for the entire state of Michigan, except the Upper Peninsula.

The new distributor is experienced and equipped to furnish an exceptionally high standard of service and sales to the territory. A full line of drilling and fishing tools will be carried in stock. Drillers will find the Straker Supply ready to help with their problems at all times.

——o——

"He seems to have a very good opinion of himself."

"Yes. On his last birthday he sent his parents a telegram of congratulation."

Glen Anderson covers a lot of territory in the northern peninsula of Michigan. Here two of his helpers are shown installing a Johnson Screen for a creamery. The helpers' names are Fred Marheini and George Anderson.

A NATIONAL WATER POLICY

Continued

The report further states that "conservation and control of waters of the United States are in the national interest, but not necessarily a function of the Federal government. On the contrary, that which can be done by the individual should be done by him, and that which requires collective action should be done at the lowest governmental level practicable. The Federal government should engage in the conservation and control of waters only when the collective action of all of the people of the nation is necessary for accomplishment of the objectives."

"Such collective action through the medium of the Federal government," the report continues, "is justified for only two purposes; first, to do those things which are essential to the national defense or otherwise of substantial benefit to all of the people throughout the nation; and second, to aid in the financing of the cost of construction works for the benefit of a limited number of people on terms equitable to all other citizens of the nation."

The panel of the Engineers Joint Council also recommended the creation of "a board of impartial analysis and appraisal of federal water projects." Commenting further, the Engineers' Report says "it is almost impossible for individual agencies, restricted by Congressional Acts and under the impact of pressure forces, to view projects objectively. Agencies which are under the necessity of competitive survival, with high principles but equally high desires to develop in size and significance, cannot be expected to appraise the validity of undertakings in the most abstract and impartial manner."

This is pretty plain talk and by many is considered an outright indictment of the officials in Washington responsible for the present confusion, inefficiency and general bungling as far as water development projects are concerned. What will be done about it remains to be seen. The only thing that will correct the situation is the election to office of people who are awake to the situation and have the courage to do something about it. Ordinary "run of the mine" politicians will never do it, but necessity may force it upon us before we go broke.

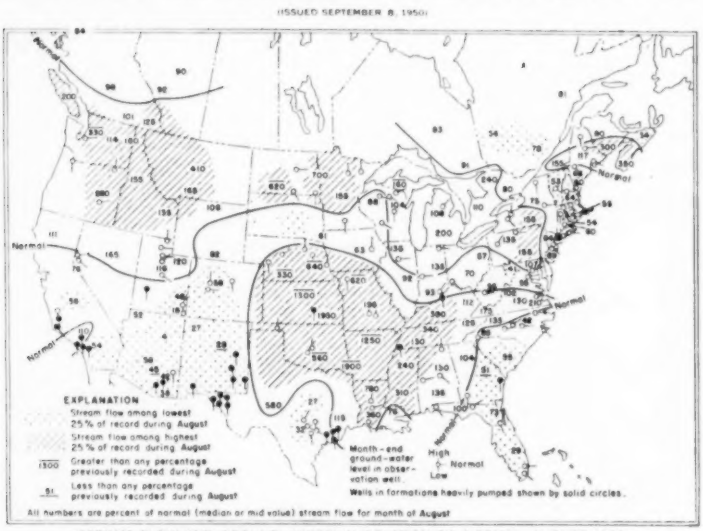
NOTICE: The Missouri Water Well Drillers Association announces the third printing of their "Water Well Handbook" by Keith E. Anderson. The price of $2.00 is cover cost of printing and mailing. Order from Dale L. Fuller, Service Secretary, P. O. Box 250, Rolla, Missouri.

A haughty senior co-ed sniffed disdainfully when a small freshman cut in at the dance.

"Why did you cut in so abruptly?" she demanded.

"Well," he replied, "I am working my way through college and your partner waved a $5 bill at me." —Frivol.

SURFACE and GROUND WATER CONDITIONS


(ISSUED SEPTEMBER 8, 1950)
EXPLANATION
Stream flow among lowest 25% of record during August
Stream flow among highest 25% of record during August
Greater than any percentage previously recorded during August
Less than any percentage previously recorded during August
All numbers are percent of normal (median or mid-value) stream flow for month of August
Month-end ground-water level in observation well.
High
Normal
Low
Wells in formations heavily pumped shown by solid circles.

STREAM FLOW AND GROUND WATER IN RELATION TO NORMAL, AUGUST 1950

SURFACE AND GROUND WATER CONDITIONS

According to the Water Resources Review for July published by the U. S. Geological Survey the stream flow and ground water conditions are summarized as follows:

Runoff was excessive over a broad area from Hudson Bay to the Gulf of Mexico. No major floods accurred in any large stream but severe flash floods hit many local areas in Wisconsin, Iowa, and Nebraska. The Winnipeg River and Red River of the North remain high following the spring floods.

Runoff was deficient from southern Maine to eastern Ontario and ground water levels were also generally below normal. Wells in northern New York were so low that hauling of water for livestock was reported. In the south stream flow was generally near normal or above, except in eastern Georgia, and in southern Florida where ground water levels in the Everglades area were the second lowest of record and the lowest since 1945.

In Michigan stream flow and ground water levels were above normal on the northern peninsula, but in the north-central part of the southern peninsula water levels in 44 shallow wells averaged about 0.8 foot below normal and only 0.2 -foot above the minimum for July.

Ground water levels in much of Kansas have been rising following high precipitation while in Oklahoma water levels in shallow observation wells and also in deep wells were, with few exceptions, higher than at the end of June and higher than a year ago.

Nevada water wells generally were normal or slightly below normal except in Las Vegas and Pahrump Valleys where artesian levels continue to decline. In New Mexico in areas irrigated with ground water, levels in wells generally declined less than usual or actually rose as a result of heavy precipitation, but in the Lovington area increased ground water development caused a decline greater than normal. The abnormal precipitation during the last two summers has in general failed to cause any overall net rise in ground water levels.

Ground water levels on Long Island in New York were near normal, but in the St. Lawrence Valley they continued below normal, declining to a new low record for the month. Reports indicate that in local areas of northern New York, wells were so low that it was necessary to haul water. In Pennsylvania ground water levels throughout the state continued to decline during the month but generally they remained above the average, the greatest rate of decline occurred in the eastern part of the state.

In the August issue ground water levels in Wisconsin in all observation wells in both deep sandstones and shallow limestone in the Milwaukee area are higher than a year ago, but below the average for the period 1947-50. In Nebraska ground water levels in Morrill and Banner Counties declined, while levels in Scotts Bluff and Sioux Counties showed a seasonal rise. In Wyoming records of observation wells over a 1 to 4-year period show little change in ground water levels in the Riverton, Owl Creek, and Paintrock areas. In New Mexico ground water levels continued to fall during the months in the areas where ground water is used for irrigation, the departure from averages being greater than last year.

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WILLING WATER

Reddy Kilowatt who has made life easier for all of us now has a partner known as Willing Water. These two working together has improved living conditions for vast numbers of people, particularly in the rural areas.

In fact, it may be said that the day of the old back-breaking pump is over and a cycle has been completed as far as farm living is concerned. Reddy Kilowatt didn't get started until about 1910 but since then he and his partner have really grown up.

Recent figures show that more than one-third of the nation's 5,850,000 farms know Willing Water and in 3,350,000 of these farms both of the partners are working. It looks as though the two of them would be known on all farms by maybe 1955 or 1960. One good thing about these two, they always pay their way, perhaps not in money profit but satisfaction of living with all of the comforts and conveniences of the city.

—o—

Judge: "Aren't you ashamed to have your wife support you by taking in washing?"

Guilty One: "Yes, I am, your Honor. But what can I do? She's too ignorant to do anything better.

ASSOCIATION NEWS

This section is devoted to the exclusive use of water well drillers' associations, both state and local. Notices, announcements, changes of officers and other items should be sent to The Editor, Johnson National Drillers' Journal, 2304 Long Ave., St. Paul, Minnesota.

OHIO MEETING

A regular meeting of the Ohio Association was held at the State Office Building in Columbus, Saturday, August 19, 1950.

The Cameron Tool and Supply Company of Cameron, West Virginia, and Peerless Pump Division of Indianapolis, Indiana, furnished speakers for the meeting as well as the State of Ohio. Mr. E. D. Allen, Secretary and Treasurer, Steubenville, Ohio, arranges these meetings.

EMPIRE STATE MEETING

The Empire State Association held its second biennial exposition July 13, 14 and 15, at the Hotel Syracuse with exhibits on display at the Artillery-Engineer Armory.

During the meeting, which was well attended, representatives of the American Brass Company, Bucyrus-Erie Company, Spang and Company, and others, addressed the group. E. S. Asseltine of the U. S. Geological Survey and C. R. Cox of the State Department of Health also spoke during the meeting.

Sight-seeing trips were provided for the ladies with cocktail hour and banquet on Friday, the 14th. Mr. E. R. Rosse entertained in the evening with his talk, "Safety Valve of Sanity." Mr. Ray S. Knapp of Clarence, New York, with Mr. Fred Merrill of Liverpool were responsible for the success of the meeting, which was insured by the registration of 200 people.

A quarterly meeting will be held at the Mark Twain Hotel in Elmira October 11th.

NORTH DAKOTA MEETING

The annual meeting of this association was held as scheduled at the War Memorial Building in Bismarck July 24, 25 and 26. Display space was available both inside and outside of the building which was taken advantage of by manufacturers and exhibitors. About seventy-five drillers were in attendance at the meeting.

Among the speakers were Byron Dickey of George A. Clark & Sons, Minneapolis, and Don Akin of the U. S. Geological Survey. The meeting closed with the annual banquet and entertainment, following the re-election of all officers.

VIRGINIA MEETING

The first annual meeting of this association will be held at Roanoke, September 29 and 30. New directors and other business of interest will be taken up during the meeting. There will also be a demonstration of electric well logging and space for the exhibition of drilling equipment.

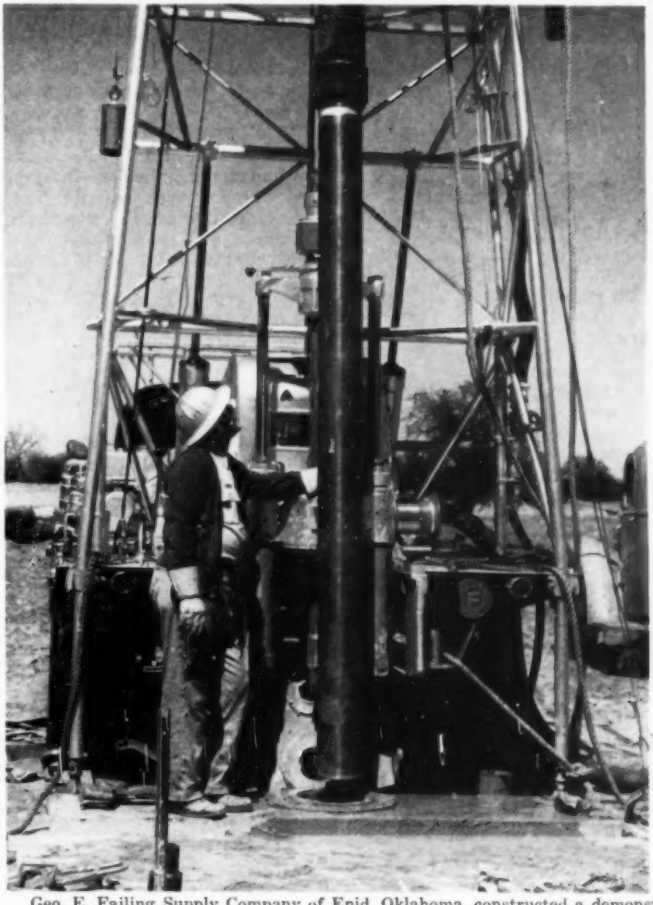
While this association is just one year old, it has already been instrumental in the passage of a bill relieving the rigid inspection formerly required on mounted well drilling equipment. Chester R. Sundquist of Norfolk is Secretary and in charge of arrangements.

NORTH CAROLINA MEETING

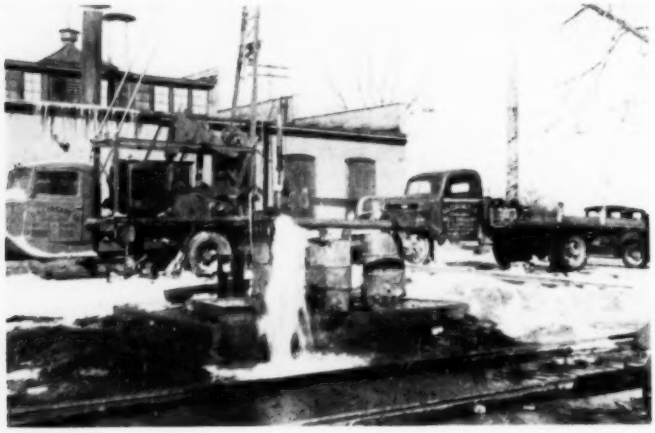
We have been advised this association will hold its annual meeting September 21, 22 and 23 at the Hotel Selwyn in Charlotte, North Carolina.

Mr. R. O. Heater of Raleigh is Secretary-Treasurer. The convention committee has arranged for exhibit space and a complete program of speakers, entertainment and prizes, followed by the annual banquet meeting.

(Continued on Page 12)



Geo. E. Failing Supply Company of Enid, Oklahoma, constructed a demonstration well with one of their rotary drilling machines, on the Yolo Ranch in Oklahoma. A Johnson Everdur screen was used to make all of the water available with the least drawdown under pumping.



O. O. Corsaut Company of Royal Oak, Michigan, has many good wells to its credit in the Detroit area. They are equipped for all types and kinds of well work and operate several rigs the year around.

Association News Cont'd.

COLORADO MEETING

The annual meeting of the Colorado Association will be held at the Shirley Savoy Hotel in Denver, Colorado, November 1 to 4. Information regarding this meeting can be obtained from W. E. Code, Secretary, care of the Colorado A. & M. College, Fort Collins.

KANSAS MEETING

The third annual convention of the Kansas Association will be held at the Municipal Auditorium, Great Bend, Kansas, on October 13 and 14. A complete program of interest to drillers has been prepared by A. R. Leonard, Service Secretary.

Among the speakers are Mr. Lawrence Eberhart of Ideco, Mr. O. S. Fent, Groundwater Hydrologist, Mr. Fred R. Whitten of Haliburton Oil Well Cementing Company, and Mr. Robert Smrha of the State Division of Water Resources.

The annual banquet will be held in the Santa Fe room of the Hotel Parrish on the evening of October 13.

OKLAHOMA MEETING

The second annual meeting of the Oklahoma Association will be held November 24 and 25 at the Extension Study Center, North Campus, University of Oklahoma, Norman.

The convention will feature equipment displays both indoor and outdoor with definite periods of inspection and demonstration. Speakers will be available with a program of interest to drillers, with the usual election of officers. The afternoon of the 25th will be set aside for the Nebraska-Oklahoma football game. Write Mr. L. J. Clarke, Secretary, 3400 North Eastern, Oklahoma City 5, Oklahoma, for complete information as to this meeting.

CALIFORNIA MEETING

The Associated Drilling Contractors of California will hold its second annual meeting in Sacramento, October 5 and 6, according to R. J. Jacinto, Secretary. It is expected that 200 well drillers will be in attendance at this meeting.

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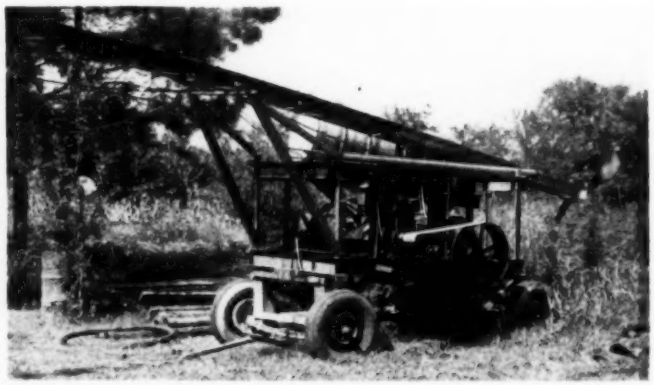
PENNSYLVANIA MEETING

The eastern division of the Pennsylvania Water Well Contractors Association held a meeting at the Hotel Edison, Sunbury, Pennsylvania, on July 22 with forty-three drillers in attendance. At the same time the western division held a meeting in Butler, Pennsylvania, with seventy-nine present. Both divisions arranged to meet at State College, Pennsylvania, on August 26, for the purpose of acting on a proposed constitution.

Mr. G. W. Walters, President of the western section, and Mr. N. A. Cook, President of the eastern section, presided at this meeting which had more than sixty members in attendance. Mr. John D. Ridge, Professor of Economic Geology, discussed "The Contamination of Pennsylvania Ground Water Supply."

At the luncheon held at the Nittany Lion Inn Dr. A. W. Ganger, Director of Mineral Industries Experiment Station, spoke to the group. This was followed by a business meeting in the afternoon at which time J. V. Boehm of Zelienople was elected Executive President of both sections. The next meeting of the eastern section will be held in York, Pennsylvania, September 23.



This machine is For Sale by Marcus Blair of Evergreen, Alabama. For description see advertisement under Ads.

Mr. E. C. Finch and his son put in many good wells in the vicinity of Galesville, Wisconsin. Recently they have completed some wells to be used for irrigation. One of these wells recently tested on the farm of Roy Bockenhaver was pumped at a rate over 300 g.p.m.

At the Sunbury meeting Dr. Jack B. Graham, District Geologist of the U. S. Geological Survey, discussed "The Importance of Well Records." Mr. Troeller and Mr. Rulon reported on the meeting of the New York Association recently held at Syracuse, New York.

IOWA MEETING

The Iowa Association will hold its 22nd annual meeting at the Hotel Fort Des Moines, Des Moines, Iowa, January 24 and 25, 1951. Plans are being worked out by Travis C. Parker, Secretary, West Branch.

NEW DISTRIBUTORS

The A. O. Smith Corporation of Milwaukee, manufacturers of a complete line of vertical deep well pumps for all applications, have appointed R. R. Howell Company, Minneapolis, Minnesota, exclusive distributors of this equipment in Montana, North Dakota, Minnesota, Iowa, and the western part of Wisconsin.

The R. R. Howell Company invites inquiries and will be glad to send descriptive literature on request.

K. J. Thompson sends us this picture of his father, founder of the firm A. J. Thompson and Son, Dunn Center, North Dakota, operating his drilling rig forty years ago. K. J. Thompson started drilling wells in 1917 and occasionally used the old rig. His boy now twenty years old is drilling with a modern machine as the firm has an Armstrong 35W and a Bucyrus-Erie 21-W.

INDIANA CONSERVATION CONFERENCE

The status of Indiana's ground water resources will be considered when the first Indiana Water Conservation Conference meets at Purdue University on November 28 and 29. This first conference of interested groups will be limited to the problems of ground water conservation.

The organizations participating in the conference represent industry, education, government, and various professional groups interested in the problems of conserving water resources.

The attention of the conference will be directed on the first day to a consideration of the present situation in Indiana with regard to ground water and the demands of domestic, industrial, and agricultural users. Geological and meteorological factors affecting water supply will be covered in the discussions.

Specific topics will cover a review of current ground water investigations, a discussion of a federal water resources policy, the effect of population trends on domestic water usage, and the effects of excessive runoff and cyclic rainfall.

The conditions to be faced as a result of present and future water requirements, and conservation methods designed to help meet the problems of increased demand are scheduled for consideration on the second day. These discussions will cover runoff control, water spreading, legal controls, pollution control, the water requirements of air conditioning equipment, and the reduction of wastage.

——o——

"My first turkey!" exclaimed the bride proudly, as they sat down at the table.

"It looks swell, darling," said her husband. "What did you stuff it with?"

"Stuff it with? Why honey, this one wasn't hollow."

Drillers!

We can use more pictures. Tell us if you want them back. Please send them now to

EDWARD E. JOHNSON, INC.
St. Paul 4, Minn.

ADVERTISEMENTS

We will insert advertisements for drilling equipment wanted or for sale, help or work wanted, etc., for our readers, free of charge. Advertisements must be brief, and we cannot assume responsibility for them, but will be glad to put parties in touch with each other by this means and suggest that they investigate any offers or inquiries carefully for themselves.

FOR SALE OR TRADE—One Armstrong Drilling Machine with steel derrick mounted on 4-wheel rubber tire trailer; also pump tools and business and one '41 Ford pickup and a '41 Chevrolet truck. Write: Hans Madsen, 423 10th Street South, St. Cloud, Minnesota.

FOR SALE: 21W purchased new in 1949 mounted on a 1941 Chevrolet 1½-ton truck; 500 feet of ⅝-inch drill line, 500 feet ⅜-inch sand line, blower, tool guide (Keystone), complete string of tools for 5⅝-inch hole and an acetylene welded; price complete $3,250.00. Write: Max Linn, Black Rock, Arkansas.

FOR SALE: Austin drilling rig, mounted on '35 Chevrolet truck, both in very good condition; 34-foot derrick powered by Model A motor and transmission. This machine is operating every day. Write or phone Walter Ervin, Kerkhoven, Minnesota, phone 1F26.

FOR SALE: Drilling equipment, one 55 Star on Diamond T-35 truck with cable and tools, practically new; also one 71 Star on Studebaker '48 truck with cable and tools, one month old. Will sell with or without tools. Write or phone: Harold Flolo, Ortonville, Minnesota.

FOR SALE: One all-steel well drilling machine mounted on International Tractor; drills from 4-inch to 14-inch wells, about 300 feet cable. Write: Mrs. Joseph Eggum, Box 342, Elbow Lake, Minn.

FOR SALE: Slim hole rotary drill rig, mounted on heavy White truck, a frame derrick and hoist, Wheatley, Mission, fitted pump 75 engine, double drum American Hoist with 50 H. P. engine, table, hose, etc., complete with drill collars, 450 drill stem and Hughes rock bits, mud mixer, tongs, slips heavy army trailer for hauling stem, Kelley, etc., rig complete ready to go; photographs on request. This outfit cost $20,000.00 to assemble, best offer takes cash, f. o. b. Delafield, Wisconsin; also for sale, No. 1½ Steel Keystone drill, a frame steel derrick with hoist, Bucyrus rubber top, Waukesha 4 cylinder engine, V-belt drive with Cotta, transmission mounted on dual Titian truck with platforms for hauling rig and truck as is, no tools nor lines. Price cash $1,500.00; 6-inch tools and lines as is on machine, add $500.00 f. o. b. Delafield, Wisconsin. Write: Gray Well Drilling Company, Inc., P. O. Box 181, Delafield, Wisconsin.

FOR SALE: One No. 16 Ideco Spudder mounted on 2-ton 1940 International truck, rig is 3 years old; tools from 4 to 12 inches; reason for selling, health bad; also have Hobart Welder 250 amp. like new, cost $850.00, will sell for $600.00. For price on rig and tools, write: Ralph Stone, Route 1, Shady Lawn Farm, Langsville, Ohio.

The Saltzgaber Drilling Company in Ohio was about to develop a satisfactory well with this 4-inch Johnson screen 15 feet from a well which produced no water at all and in an area where three gallons per minute is an excellent well.

FOR SALE: One No. 42 Cyclone Spudder with 6 cylinder Continental Industrial Motor mounted on 1937 two-ton International truck; spudder and motor in A-1 condition; also one 1½-ton Ford truck and large assortment of tools; complete outfits and equipment priced for quick sale. Write: P&H, c-o Edward E. Johnson, Inc., 2304 Long Avenue, St. Paul, Minnesota.

FOR SALE: One 22-W Bucyrus-Erie drilling machine mounted on a 1936 1½ ton Diamond T truck; machine and motor are in excellent condition; price for complete outfit $3,200.00. Write: Hoeg & Ames, Lincoln, Iowa.

FOR SALE: One No. 282 Star rig, 4 yrs. old; $4,000.00; 12" and 16" bits; and tools; a good buy; reason for selling, ill health; rig is in Elko, Nevada. Write: R. L. Norris & Son, 222 Sage Street, Reno, Nevada.

For Sale: Keystone No. 70, all steel 32-foot derrick with rubber shocks; mounted on Dodge truck; two complete strings of tools with drive clamps, wrenches, bailers, jacks, forge blower, etc.; drill bits for 4", 5", and 6" holes; in very good mechanical condition. Write: C. L. Benson, 6906 Bellona Avenue, Baltimore 12, Maryland.

FOR SALE: One standard 82-foot angle iron steel Newton-Falls derrick with steel bull wheels and posts, beam, and bandwheel, tugs and sandreel; and with large Waukesha drilling unit for power and complete string of drilling tools; and a number of fishing tools with other odds and ends of other outfits; reason for selling, retiring. Write: Dillon & McFrederick, 17815 Lakewood Heights Blvd., Lakewood, Ohio.

WANTED: Boring rig suitable for 4", 6", 8", and 10" bores. Send full particulars and lowest prices to THE FORIMEXCO (Engineers) LIMITED, Bareilly, India.

FOR SALE: One 21-W Bucyrus-Erie drilling machine, mounted on all-steel frame; string of 4" tools; 300-ft. sand line; and 300 ft. ⅝" drilling cable; 9 h.p. Wisconsin motor in excellent condition; price $1,000.00. Write: Marcus Blair, Evergreen, Alabama.

FOR SALE: Water well drills, truck mounted rotaries. Sullivan 1000-foot capacity; Franks 1000-foot capacity; Failing 1500-foot capacity; all complete, tools, etc. Could supply diamond core barrels. Write: Fred E. Butler, Box 1832, Casper, Wyoming.

FOR SALE: 1500-foot Failing Rotary, complete with rods, bits, taps, hooks, etc. Everything in A-1 condition. Reason for selling, health. Write: Emil T. Grosz, Box 124, Delmont, South Dakota. Telephone 88.

WANTED: Two dependable cable tool rock drillers to operate Keystone No. 50 machines . . . 6 and 8 inch diameter wells . . . steady work. Write: Nicola Cristofalo Associates, 150 Sunnyside Avenue, Pleasantville, New York.

FOR SALE: Howell No. 60 trailer mounted all steel drill; pneumatic tires; less tools. Write: Box ACW, c/o Edward E. Johnson, Inc., 2304 Long Avenue, St. Paul 4, Minnesota.

(Continued on Page 15)

(Continued from Page 14)

FOR SALE: Complete well drilling equipment including reverse hydraulic rig mounted on Chevrolet truck with new engine, power take-off driven, economical operation, drills up to 40" hole, 220 ft. drill stem 6", light plant, all necessary tools and bits; also 4 trucks, water tanks, semi-flat bed trailers, low boy trailers. All in perfect condition. Write: George F. Walter, 309 Ringland Road, Hastings, Nebraska, for full particulars.

WANTED: Irrigation-well drilling outfit, prefer used. Write: Conrads, Gaylord, Kansas.

FOR SALE: One Failing heavy duty 1500-ft. rotary rig with 38-ft. mast and 5" x 6" mud pump, mounted on 1948 Chevrolet 6x6 truck, excellent condition; price on request. One Failing heavy duty 1500-ft. rotary rig with 27-ft. mast and 4½" x 6" mud pump, mounted on 1948 International KB6 with KB7 motor; price $9,500.00. One Failing 314-C rotary rig with 27-ft. mast and 4½" x 5" mud pump, mounted on G.M.C. 4x6 army type truck; price $7,500.00; water tank trucks, drill pipe, subs, etc. available for all the above drills at reasonable prices. Write: Mountain States Exploration Drilling Company, 141 S. Durbin Street, Casper, Wyo.

WANTED: Good spudder, complete, used but in perfect condition, to drill water wells down to 1200 feet. Write: Julio Montano, Av. Elena Norte 8-A, Guatemala, Guatemala.

WANTED: Boring rig suitable for 4", 6", 8", and 10" bores. Send full particulars and lowest prices to the FORIMEXCO (Engineers) LIMITED, Bareilly, India.

FOR SALE: Bucyrus-Erie 21-W mounted on a 1939 1½-ton International 800-ft. new drill line; 15-ft. stem, new jars, rope socket, bailer wrenches, forge blower, and bits all for 6" holes with 2 - 3.7 API joints; purchased new in the last part of 1948 and has actually drilled less than 2000 ft. of hole; truck is in first-class shape; fishing tools and all goes for $3,500.00 or would sell for less without tools. Write: Dee Linn, St. Joe, Arkansas.

FOR SALE: No. 16 Ideco Spudder mounted on K-5 2-ton International complete with tools; 38-ft. telescope mask electric starter and clutch on motor; in first-class condition. Write: Frank C. Druse, Springfield Center, New York. Telephone Richfield Springs 497-W-2.

FOR SALE: Generator plant, 4½ H.P. AC 110 volts, 60 cycle, one or three phases, coupled to Hercules 12 H.P., 4-cylinder gas engine. Entirely enclosed and on skids. Write: William McCormick, R.D. 2, Route 62, Canfield, Ohio.

WANTED: 2" or 3" well drilling rig, complete with tools. Write: Payton Construction Company, Excelsior, Minnesota.

FOR SALE: 33-W Armstrong drilling machine, all steel with telescoping derrick; mounted on 37 International truck; machine and truck in A-1 condition, with 500 feet ⅝ and ⅜ cable. Write: Art Vinson, 1210 So. 25th St., Fort Dodge, Iowa.

FOR SALE: Used, one set heavy jars, 2x3 joints, 5½x18 ft. ton valve bailer, one 2x3 joints 6-in. bit, approx. 150 lbs. Write: F. E. Scanlin, Box 16-C, Dushore, Pennsylvania.

FOR SALE: One pair cast steel tool wrenches, opening 1⅞", used very little, $25.00; one pair drive clamps for 1¾" tool square, $25.00; one 3" bit, never been used, joint 1⅛"x1¾" A.P.I., $25.00; one new drive belt, never been unwrapped, length 17' 6½" (new), $15.00, f.o.b Troy, Alabama. Write: W. G. Law, Troy, Alabama.

WANTED: Pump Salesman; must have good working knowledge of all types of pumps from domestic to irrigation. Should have some experience in well drilling. State age, experience and salary. Located between Tampa and Plant City. Write: Kriska & Son, Saffner, Florida.

—o—

Little girl (on a transcontinental train)—"Mama, what's the name of the last station we stopped at?"

Mother — "Don't bother me. Can't you see I'm reading? Why do you ask?"

Little girl — "Because brother got off there."—Pictorial Review.

The Franks Model 2000 truck mounted, truck engine driven rotary type water well drilling rig is primarily designed for ruggedness in construction, yet offering maximum portability and maneuverability over the roughest type of terrain.

The machine is complete with 43-foot derrick, mud pump, double drum draw works, swivel, rotary table and kelly. The unit is well within highway limitations with regard to width, length, height, and weight, and has been used extensively throughout the world for water well drilling and oil production.

For further information concerning this rig, write Franks Manufacturing Corporation, Drawer 3218, Whittier Station, Tulsa, Oklahoma.

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Like the duck hunter, the alert well driller can't afford to take chances—he uses Johnson Well Screens in every sand well. The driller who finishes a well with Johnson Well Screens will come home with "the limit" of customer satisfaction, and the prestige which comes with satisfied customers.

Why gamble with your customer's well?
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Johnson Screens Make Poor Wells Good and Good Wells Better

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